Washington Park Arboretum Bulletin

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Cover

Autumn in Washington Park Arboretum

Joy Spurr

WPA's popular Carriere hawthorn stands by the edge of Arboretum Drive East. *Crataegus* x *lavallei* 'Carrierei' (in grid 31-3E on the Arboretum map) is striking throughout the year. About 25 feet tall with a wide canopy, it has dark, leathery leaves whose autumn hues of red survive most of the winter to complement long-lasting clusters of orange-red fruit. Spring welcomes its white floral display. The Arboretum has almost 20 other hawthorn species or cultivars, with other flower and berry colors.

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The Arboretum Foundation is a nonprofit organization that was chartered to further Washington Park Arboretum development, projects, and programs through volunteer service and fund raising. Its mission is to ensure stewardship for the Washington Park Arboretum, a Pacific Northwest treasure, and to provide horticultural leadership for the region. This stewardship requires effective leadership, stable funding, and broad public support.

Washington Park Arboretum (WPA) is administered cooperatively between the University of Washington's Center for Urban Horticulture (CUH), the City of Seattle Department of Parks and Recreation, and The Arboretum Foundation. The programs and plant collections are a responsibility of CUH.

WPA is a living plant museum emphasizing trees and shrubs hardy in the maritime Pacific Northwest. Plant collections are selected and arranged to display their beauty and function in urban landscapes, to demonstrate their natural ecology and diversity, and to conserve important species and cultivated varieties for the future. The Arboretum serves the public, students at all levels, naturalists, gardeners, and nursery and landscape professionals with its collections, educational programs, interpretation, and recreational opportunities.

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In the Washington Park Arboretum

Fall into Winter

Collections/Research

Recent successful propagation of *Danae racemosa* (534-68), which was growing in poor soil conditions at the top of Rhododendron Glen, and *Populus nigra* (827-58), which has reached a mature age and is now riddled with rust disease, will allow for new plants to be planted back into the collection in an appropriate location as vigorous new specimens.

Chris Gee, junior at Michigan State University, interned this summer with Randall Hitchin, Registrar & Collections Manager. He evaluated the inventory of the *Cupressus* and x *Cupressocyparis* collections. The work will be invaluable as we update this important collection of conifers.

Collection records are at the heart of our collection management. The Curatorial Office is nearing the completion of its first phase of computer upgrades. These improvements allow users access to the Plant Records Database (over 10,000 records) from three machines. The system also includes several new data security enhancements that reduce the probability of data loss or corruption. In the process, we have gone from one stand-alone computer running Windows 3.1 to a Windows NT network with two client machines.

Conservation

During July, the final plans for the new drainage system in the *Sorbus* (mountain ash) Collection were reviewed by the Seattle Parks Department. The old system collapsed, so WPA added underground tiles and drains to the site, with funds from The Arboretum Foundation's special appeal to its members and donors.

Education

Karin Gallacher, an Urban Horticulture undergraduate, has been conducting a student project to review the plants in the New Zealand Garden. She compiled a list of all plants that have been in the garden, from the first ones through the present day. Karin also studied how to obtain new seed sources for plants we do not have—plants that have been lost or are doing poorly on the site—such as *Pachystegia insignis* and *Metrosideros umbellata*.

Display

The Arboretum has experienced more vandalism damage in 1999 than in any previous year and was saddened by the destruction of a prominent cherry tree, *Prunus* 'Accolade', along Azalea Way, during the Fourth of July holiday. Apparently a large "firecracker" was placed in a crotch of the tree and ignited. The specimen, valued at nearly $3000, was irreplaceable.

During the next weekend, three collection hollies were entirely stripped of their branches.

On the positive side, WPA Horticulturist Christina Pfeiffer reports that 246 accessions were added to our collections, during planting year 1998–99. This includes a large number of specimens in the conifer area, Rhododendron Glen, and the Magnolia Collection.

According to Plant Propagator Barbara Selemon, since January 1, 1999, 140 new plants have been obtained to grow on in the Arboretum nursery. Those that are especially of interest include *Berberis hookeri, Hydrangea heteromalla, Ceanothus impressus* 'Puget Blue', and *Arctostaphylos* 'Winterglow'.

Several new cultivars and species of maple, rhododendron, and hydrangea will soon be planted on the grounds. We are thankful to Heronswood Nursery, Rhododendron Species Foundation, Oregon University Research Station, and Meerkerk Rhododendron Gardens for the new plants.

John A. Wott

John A. Wott, Director
Washington Park Arboretum

Eucommia ulmoides (hardy rubber tree) fall color in late October. Photo by Joy Spurr

From the Arboretum Foundation

The Cycle of Change

It's difficult to choose a favorite time of year in the Washington Park Arboretum—each season brings out the beauty of this wonderful public garden. Fall adds layers of color to the Arboretum's green canvas and is a refreshing chapter in the annual cycle of change that makes any visit to the Arboretum a new experience.

Inside the offices of The Arboretum Foundation, another cycle of change is underway, as the results of many hours of planning and work become as noticeable as the autumn leaves. I am happy to report some of the accomplishments of the Foundation and its staff in recent months, as well as some of the changes that lie ahead.

Volunteering is becoming more convenient, more fun, and more rewarding. In recent months, the Foundation has enjoyed the services of a full-time volunteer coordinator, who has already significantly improved how volunteers are recruited, managed, and acknowledged.

The groundwork needed to reap greater results from a major gift and planned giving program in the years ahead is happening now. The Foundation's Annual Fund, supported twice yearly by direct mail appeals, continues to successfully provide funds for special Arboretum needs such as extra seasonal gardeners, improving the *Sorbus* (mountain ash) Collection, and general operations. Our new director of development is expanding these fund-raising programs.

Big changes are just ahead in two crucial components of Foundation operations: the look of our printed materials and our telecommunications system. These two improvements, both funded by grant moneys, will vastly improve our communications capacity. The Foundation will become more visible and viable in the public eye and will be able to conduct business and public outreach in a much more efficient way. In today's media- and technology-savvy marketplace, communication enhancements are not just desirable—they are necessary.

These changes, as well as ongoing improvements in daily operations and the continued development of our voluntary leadership—the Foundation Board of Directors—add up to a more efficient and more effective organization, one better prepared to fulfill its mission in the years ahead.

Our success will be apparent when you see improved maintenance and collections, hear of more grants being awarded, and are tempted by better volunteer opportunities.

I hope you will continue to join us in the cycles of change that bring new seasons to the Washington Park Arboretum and new accomplishments to The Arboretum Foundation.

Deborah Andrews

Deborah Andrews, Executive Director
The Arboretum Foundation

How in the Arboretum?

Weed Control in Fall & Winter

BY CHRISTINA PFEIFFER

Controlling weeds is a year-round effort in the Pacific Northwest. Certain weed species are always present in some stage of growth or reproduction, so weed control is always on the docket of the Arboretum's maintenance schedule. It could be the same in your garden.

Winter Annuals. It pays to be vigilant about weeds, even in autumn. Winter annuals germinate in the fall, and many will escape your notice without close examination. They overwinter as small seedlings, sitting poised for spring to burst into king-sized dimensions. Some examples are herb Robert *(Geranium robertianum)*, shotweed *(Cardamine oligosperma)*, shepherd's purse *(Capsella bursa-pastoris)*, dwarf fireweed (*Epilobium watsonii)*, and chickweed *(Cerastium vulgatum)*.

Control these pests by removing the seedlings in fall, and applying 3 to 4 inches of a coarse mulch, such as wood chips or shredded leaves. Weed seeds are less able to germinate on (or beneath) these coarse materials than on bare soil or compost.

Herb Robert's seed is propelled many feet into the air. In our efforts to battle its establishment, the Arboretum finds it best to wait until after some good fall rains have washed the seeds down from their perches in overhead shrubs, and then mulch.

Perennial Root Systems. This is also a productive time of year to battle perennial weeds with extensive underground roots and rhizomes: morning glory *(Calystegia [*formerly *Convolvulus] sepium)*, horsetail *(Equisetum arvense)*, and English ivy *(Hedera hibernica)*. Prepare before the foliage dies down for the year, by marking locations where morning glory and horsetail are thick.

Once the soil is fully damp and friable, it gives up the roots easily. It is incredibly satisfying to use a spade fork to extract piles of rhi-

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zomes, ivy stems, and roots. Morning glory roots look like spaghetti. Horsetail rhizomes are dark brown with hairy root nodes every couple of inches. Never add these weeds to home compost piles, which generally do not generate enough heat to destroy them.

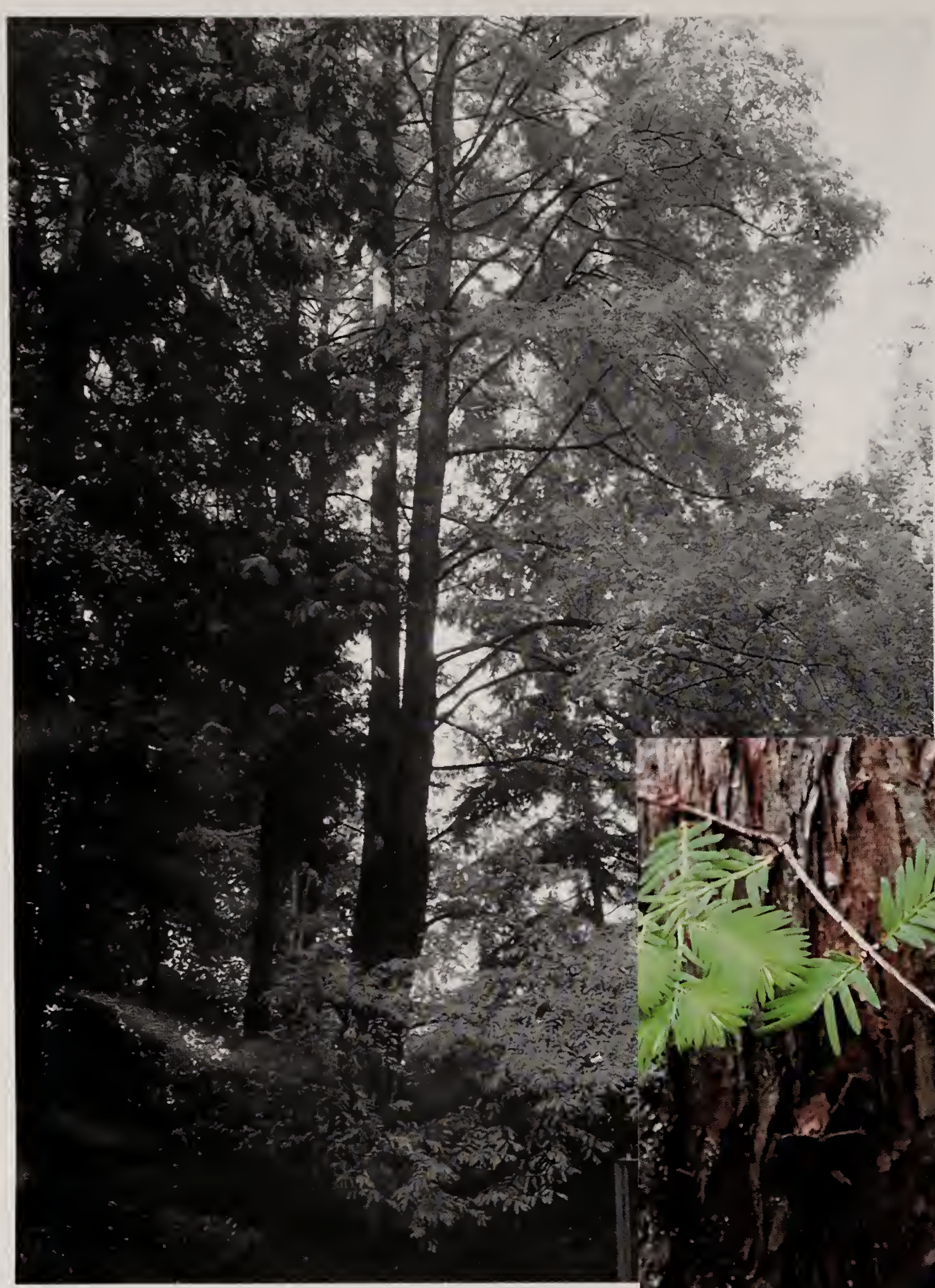
In cases of extremely heavy infestations, the Arboretum achieves good control of both morning glory and horsetail, through careful applications of dichlobenil (Casoron) in January and early February; the timing is critical. It is then possible to move on to manageable routine care and landscape changes without continually depending upon herbicides.

For most home landscapes, well-timed and persistent mechanical control provides excellent results without herbicide use.

Christina Pfeiffer has been the Horticulturist for Washington Park Arboretum since 1987. Reach her at: cpfeif@u.washington.edu

OPPOSITE PAGE
TOP: English ivy *(Hedera hibernica)*
BOTTOM: Hedge bindweed (*Convolvulus arvensis)*

THIS PAGE
ABOVE: Shepherd's purse *(Capsella bursa-pastoris)*
RIGHT: Morning glory *(Calystegia sepium)*



Metasequoia glyptostroboides, the dawn redwood, was once considered to be extinct. However, it surfaced in 1945 in China. Photos by Joy Spurr

There Could Be Dinosaurs

The story of the dawn redwood

BY MARTHA POLK WINGATE

"There Could Be Dinosaurs" headlined an article in the January 3, 1948, issue of the *Saturday Evening Post.* The author's theory that these ancient creatures could still be lurking in the swamps of tropical Africa must have excited the adventurer in many a reader. The imagination raced at the thought of the unknown, and though the author attempted to keep his tone as scientific as possible, he, too, was caught up in the possibilities.

Yet just a few years earlier, in 1938, a really and truly living fossil, the coelacanth, was discovered. Thought to be extinct for 70 million years, the fish was caught off the coast of South Africa.

The specimen was put on display in East London, South Africa, for one day, and 20,000 people came to see it. Scientists had a difficult time with only one specimen (especially one that had already been stuffed and mounted by the time they got to it), but they had to wait 14 years before another coelacanth was found.

Next came a "living fossil" discovery closer to the hearts of botanists, which prompted E. D. Merrill, botany professor at Harvard's Arnold Arboretum, to mention the *Saturday Evening Post* dinosaur article. Out of China came word in 1945 that *Metasequoia glyptostroboides,* the dawn redwood, was not extinct as thought, but alive and well in northeastern Sichuan Province. A holdover from the age when gymnosperms and giant reptiles ruled the earth, only fossil records previously had shown the delicately long compound leaves of this deciduous conifer. In 1941, paleobotanic records helped botanists place it in its own genus, after its initial inclusion in *Sequoia.*

The Washington Park Arboretum (WPA) has a direct link to the rediscovery of this ancient tree. In January 1948, Merrill sent a letter to the Arboretum Foundation and 10 other institutions, enclosing a package of seeds he called "a remarkable conifer." The seeds had been collected on an expedition Arnold Arboretum had sponsored the previous year (with a grant of $250). The letter included a description of the tree's native habitat and indicated Merrill's hope that with wide distribution, the seeds would find favorable conditions.

WPA's director, Brian Mulligan, sent an immediate response thanking Merrill for the seeds. Mulligan then sent some on to Strybing Arboretum in San Francisco, and some to Ireland. And soon, everywhere, seeds began to germinate.

In spring 1948, Mulligan wrote that seeds of "the unique and well-publicized Chinese coniferous tree, *Metasequoia glyptostroboides"* had begun to germinate. And by spring of the following year, seedlings were so prevalent that Carl S. English of Seattle's Chittenden Locks gardens "kindly presented us with 50 seedlings of *Metasequoia* to augment our small stock."

But the germination of prehistoric trees is fraught with danger even in modern times. In summer 1950, Mulligan reported on the germination progress of some *Metasequoia* seeds. After 54 days of stratification, the seeds were sown on March 13, 1948, and subsequently germinated not quite a month later on April 12. The last remarks, however, in January 1949, told the real tale: "Eaten down by rabbits..."

At one time known only by fossils from the Mesozoic era, *Metasequoia* has burst onto the gardening scene in a relatively short time. It is a common, yet uncommonly beautiful, element in gardens and arboreta from Seattle to Maine and even farther corners of the globe. Once native during various periods to North America, eastern Russia, and parts of Europe, it is again a part of the landscape.

For more information, read "Metasequoia after Fifty Years," (58:4 and 59:1, 1998–1999), in *Arnoldia: The Magazine of the Arnold Arboretum.*

Martha Polk Wingate is a graduate of the University of Washington Center for Urban Horticulture. She is a freelance writer whose work appears in the *Seattle Post-Intelligencer* garden section every Wednesday.

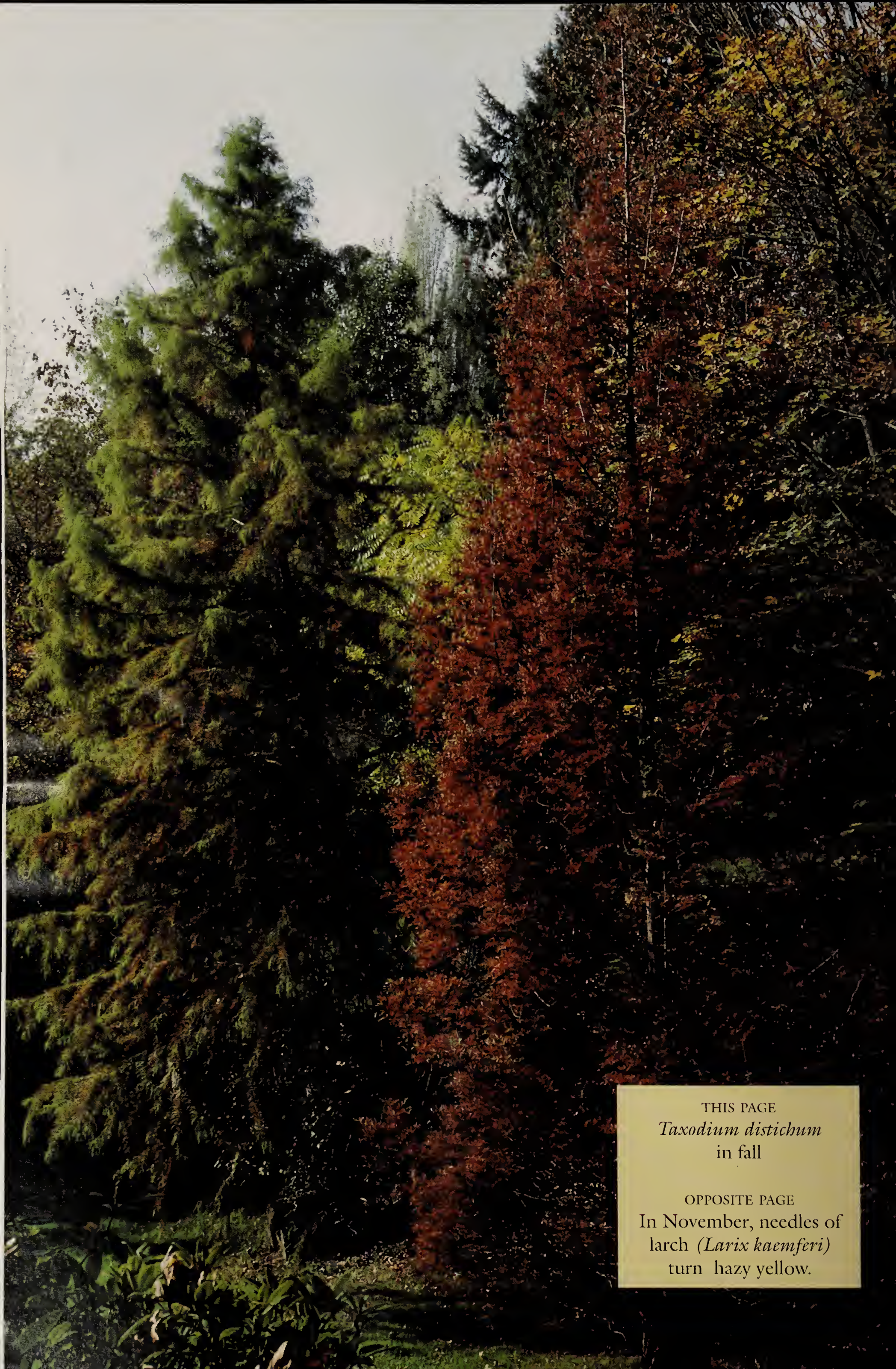
Where in the Arboretum?

The Dawn Redwood

WPA's largest specimens of *Metasequoia* can be located on grids 13-5E and 13-6E on the Arboretum map. Four of them grow along Rhododendron Glen stream.

Please stay on the trail and observe them from a distance because their root flares are easily scuffed and damaged, and soil compaction caused by foot traffic is detrimental to their root systems..

A specimen in 28-3W and one in 42-5W could both qualify as Hobbit trees. They have wide trunks with "armpits" at the base and short, thin tops. The one in 28-3W is surrounded by *Taxodium distichum;* both are good to view in autumn because of their coloring.—*Lou Stubecki, WPA Arborist*



THIS PAGE
Taxodium distichum
in fall

OPPOSITE PAGE
In November, needles of
larch *(Larix kaemferi)*
turn hazy yellow.

A Fall Tour of the Arboretum

BY JAN PIRZIO-BIROLI

PHOTOS BY JOY SPURR

Autumn covers the three months from late September through early December. However, from the perspective of plants and gardens, fall begins sometime at the end of summer when all growth has stopped, when leaves have begun to turn color, and when trees and shrubs have formed their fruits and berries. It then continues until the last leaves have fallen, the last fruits have been distributed or devoured, and temperatures have dropped to freezing. By that time, autumn has been succeeded by winter.

Although autumn is not usually thought of as a time for flowers (except for the asters, decorative cabbages, and pansies available at the local grocery store), certain trees and shrubs typically bloom during that period and, if they produce fruits, ripen in spring. In the Pacific Northwest, the best-known example of this phenomenon is *Prunus subhirtella* 'Autumnalis', the autumn-flowering cherry, which begins to bloom in October and continues to open new flowers after each freeze until it reaches its flowering climax in March.

The Arboretum has a remarkable collection of trees and shrubs whose autumn performance is superb, *vis-a-vis* foliage color, fruit, or flowers. These plants are scattered throughout WPA's 230 acres, sometimes in groups and elsewhere as single specimens.

Driving north on Lake Washington Boulevard, an excellent overview of fall color is visible in the lower reaches of the Arboretum, where Azalea Way meets Lake Washington Boulevard, just north of the Japanese Garden. Here some of the major plantings are deciduous azaleas, birches, red-osier dogwoods and, most noticeably from the boulevard, the larches. Before they fall, the needles of this deciduous conifer, the genus *Larix,* offer a soft haze of yellow, permeating the landscape like wisps of smoke.

In contrast, a single specimen of horse chestnut (*Aesculus flava;* 21- or 22-5W on an Arbore-

tum map grid) grows near the road just south of Honeysuckle Hill. Its large, palmately divided leaves become a brilliant, evenly colored flaming red in autumn.

Continuing north, the boulevard borders the Pinetum on the west. Beyond the small parking lot (33- and 34-3W) and growing in the low-lying moist ground, are handsome examples of other deciduous conifers: *Taxodium distichum* (the swamp cypress, native to the southeastern United States) and *Metasequoia glyptostroboides* (the dawn redwood from western China), whose leaves turn to wonderful shades of reddish brown before they fall. These closely related species can be distinguished from a distance by the size of their foliage. The taxodium has finely divided, almost ferny leaves, while foliage of the dawn redwood is much coarser and truly resembles that of *Sequoia sempervirens,* the evergreen coast redwood after which it is named.

North of the Lynn Street footbridge and along Foster Island Drive, the Oak Collection lies on the right. Since many deciduous oaks *(Quercus* spp.) are famous for their autumn color, this is a part of the Arboretum that deserves attention throughout the season as the various species come into their prime. Bordering the north end of this area are growing several examples of an unrelated genus, the tupelo or black gum, *Nyssa sylvatica* (44B and 45-1E). There is considerable variation in autumn color among these seedlings, but several of them display the brilliant red for which the tupelo is famous. This is a dioecious genus (sexes on separate plants). Among the group on the east side of the area is one female, which produces small purple—nearly black—fruits resembling miniature plums.

A walk south along Azalea Way from the Visitors Center is a visual adventure at almost any time of year, and autumn is no exception. The Oak Collection continues for several hundred feet along the western side, and near its southern tip grows a wonderful specimen of *Prunus subhirtella* 'Autumnalis' (38-B), one which seems to retain soft pink flowers throughout its long season more successfully than other examples of this cultivar.

Continuing south is the pond that defines the western edge of the Woodland Garden. At its east end (33-E) grows a tall, slender specimen of sweet gum *(Liquidambar styraciflua).* Its maple-like leaves turn a mixture of yellow to light red before they fall when, for those fortunate enough to see it, for one day they float face down with their stems upright like a flotilla of sailing vessels. Bordering Azalea Way on the southwestern edge of the pond is a handsome pair of Japanese maples whose identification has eluded the experts for many years. Their purplish leaves turn to bronze in autumn.

Across Azalea Way from the Woodland Garden is a large planting of several selections of *Acer rubrum,* the red maple (31- and 33-2 to 4W). Just as their stature varies from the tall, narrow 'Columnare' to the round-headed 'October Glory', so their autumn foliage ranges from bright deep red in the latter clone to orange-red in 'Schlesingeri'.

Cultivars of red maple are greatly valued as street trees because the species is native to marshy soils and is, therefore, better able to withstand the poor drainage associated with such conditions. WPA's planting of them grows at the north end of the badly drained area west of Azalea Way called "the flats." A wide variety of interesting plants has been situated here because they prefer (or at least can stand) such conditions. South of the maples are the genera of walnut relatives, including a large specimen of the Chinese wingnut, *Pterocarya stenoptera* (28-2W), which produces its winged fruits in pendulous racemes at least 12 inches long. By early fall, these have turned to a rich brown, and because of their size and profusion are extremely noticeable hanging among the golden, pinnately compound leaves.

Among the flowering cherries that grow along Azalea Way, one of the most handsome is an enormous, round-headed specimen of *Prunus sargentii* standing at the bottom of Loderi Valley (28-1W, across from the wingnut). Of all the cherries, this one sets a standard, not only for beautiful bloom in spring but also for its excellent orange and scarlet foliage in autumn. Its performance may be due, at least in part, to the fact that this species is considerably more disease resistant than many other flowering cherries.

Continuing south, dropping down into the flats, is a wonderful mixture of colored fruits and foliage. The honeysuckles (*Lonicera* spp.) and viburnums share space around the base of Honeysuckle Hill. Their berries range from translucent white resembling gooseberries *(L. quinquelocularis)* to bright juicy red (*Viburnum opulus,* the highbush cranberry). The swatch of larches that we saw from Lake Washington Boulevard East begins just east of Azalea Way. The

golden leaves of numerous birches and the reddish foliage of the red-osier dogwood species are visible from a distance. And, below the Lookout in October, the serviceberries (*Amelanchier* spp.; 10- to 12-1W to -1E) offer a fleeting display of leaves tinted in delicate shades of peach and pinkish red.

Approaching Rhododendron Glen and the Lookout from Azalea Way, detour below the trail to find a spectacular display of *Enkianthus campanulatus* (14-2E and 14-3E), some of which have brighter autumn foliage than any nursery selections.

Returning to the trail and heading south from the Lookout, find the Holly *(Ilex)* Collection (ca. 5- to 7-2E and -3E), whose red fruits traditionally ripen in time for Christmas decorations.

Holly is a far more variable genus than is generally understood. The new cultivars of the deciduous species, *I. verticillata,* with their heavy clusters of red fruits, present one example of such variability. The black fruits of the small-leaved Japanese holly *(I. crenata)* and its yellow-fruited form, 'Midas Touch', offer another extreme. As with some of the other major collections mentioned on this tour, the Holly Collection would, in its own right, be worth a special visit.

Across Arboretum Drive East from the hollies is another section whose primary interest occurs in autumn and winter. The Hamamelidaceae, named for the witch hazels (*Hamamelis* spp.), have crinkly, strap-shaped petals and an overwhelming fragrance that dominates the Winter Garden. Most of the witch-hazel family are deciduous, and most of those have excellent autumn color.

A specimen of the small tree *Parrotia persica* (7-5E) stands north of the parking lot, spreading its branches in the vase shape typical of that species. Its flaking bark is picturesquely mottled; its autumn leaves turn shades of orange and yellow tinged with red.

Further north along Arboretum Drive East, but south of Rhododendron Glen, the Camellia Collection occupies both sides of the road for several hundred feet. About a dozen cultivars of *Camellia sasanqua,* the autumn-blooming species, are scattered throughout this section. Their leaves and flowers are smaller than cultivars of the better-known *C. japonica,* and in many ways they are more attractive, primarily because they have a less formal habit, a more open form of growth. Planted among them are several species of a deciduous camellia relative, the genus *Stewartia,* including the lovely *S. monadelpha* (10-4E), whose wonderful russet-colored, flaking bark—beautiful the year round—is complemented in autumn by foliage that has turned to deep, rich maroon. A group of three multiple-trunked specimens grows west of the parking lot, placed so that they can be seen from any direction.

The Arboretum's finest example of *Franklinia alatamaha* (11-6E) faces southeast from the west side of Arboretum Drive East and thus is able to catch a generous dose of morning sun. This 12-foot-tall shrubby tree, named after Benjamin Franklin, gives it best performance in such a location. It begins to bloom in late summer and continues to open a few flowers at a time throughout autumn, while the leaves are turning scarlet. The contrast between this brilliant foliage and the single white 3-inch flowers with centers of numerous yellow stamens, makes a lovely combination.

A third species growing in the Camellia Collection, though not a relative, is lily-of-the-valley tree (*Oxydendrum arboreum*; 15-7E), which is a member of the heath family (Ericaceae). This tall, slender species has been sited along the length of Arboretum Drive East on the west side, where it enjoys sunlight for half a day. It also blooms in late summer, and blooms all at once, its tiny urn-shaped white flowers produced on 6- to 8-inch panicles, spreading clusters of racemes that resemble the fingers of a drooping hand. By autumn, these become pale, lime-green fruiting bodies that retain the same appearance as the inflorescences, beautifully complementing the brilliant display of scarlet leaves in a manner differing visually from the Franklin tree but achieving the same effect.

The Legume Collection extends along the east side of Arboretum Drive East north of Rhododendron Glen. It is interesting that here the species that offers the greatest autumn interest is not related to the pea family. *Sassafras albidum,* the mitten tree (18-4E), is a member of the Lauraceae, which includes bay leaf (the Mediterranean laurel) and the West Coast native, California laurel. Like those relatives, sassafras has been famous for its aromatic oils since its discovery in America in the 16th century. The common name comes from the fact that its 4-inch leaves may have one or two lobes or none, those with a single lobe resembling the thumb and hand of a mitten. WPA's specimen stands alone at the

TOP: The autumn leaves of *Acer palmatum* 'Dissectum Atropurpureum'

ABOVE: *Oxydendrum arboreum* and *Rhododendron schlippenbachii* in Rhododendron Glen during November.

edge of the road on the east side, a flaming beacon facing us as we walk up Arboretum Drive East. Behind it, where an enormous madrona once stood (and died, one huge trunk at a time), there is now a patch of sassafras suckers. Their leaves turn the same mixture of yellows, oranges, and pinks as those of the parent plant.

One of the most dramatic and extended displays of fall color exists in the *Sorbus* (mountain ash) Collection north of the legumes (22- to 25-4E and 5E). Here the foliage display combines with a wonderful selection of apple-like fruits (pomes). This important collection is named after Brian Mulligan, WPA's former director, who specialized in this large genus of the rose family that is divided essentially into two sections: those with pinnately compound leaves and panicles of miniature apples and those with simple leaves and fewer, larger fruits resembling crab apples. The Arboretum's collection contains a remarkable variety of species ranging from the common European rowan tree (*S. aucuparia*) with its typical red berries, to exotic species such as those with pastel fruits, including pink in *S. hupehensis* (from Hupeh, China), and white in *S. cashmiriana* (from India). These two plants tend to hold their fruits longer than others, possibly because birds see red better than other colors. A spectacular Japanese species is *S. commixta,* which has broad, densely packed clusters of small scarlet pomes that are complemented by its equally scarlet pinnately compound leaves.

Upon leaving the *Sorbus* Collection, we pass the old nursery and come once more to the Woodland Garden, across Arboretum Drive East. The Woodland Garden is another section, like the hollies and the mountain ash, that deserves a special visit of its own, if only for its Japanese maples. This beautiful valley is home to the Arboretum's important collection of Japanese maples, and many of them are noticeable from its east end. Their form varies from small trees with supple branches to low mounds whose branchlets are naturally twisted in such a way that the plant resembles a large bonsai. Leaf color in Japanese maples is equally variable, representing the entire range of autumn hues.

However, the Woodland Garden also contains many other species of considerable interest in autumn. Near the road stands a large specimen of the Carriere hawthorn, *Crataegus* x *lavallei* 'Carrierei' (31-3E; see the cover photo). This round-headed tree offers a continuing performance throughout the season. Its large crabapple-like fruits slowly ripen until they become a deep orange, contrasting attractively with the glossy, dark green leaves. It is only later that this foliage also begins to change, gradually taking on colors that almost match the fruits.

Two species that are especially interesting in fall can be seen at the southeast corner of the Woodland Garden. One is a planting of the autumn-flowering species of witch hazel, *Hamamelis virginiana* (31-3E). Several of these large shrubs border the southern edge, leaning over a service road. Their numerous small, fragrant flowers vary from a pale lemon color to rather deeper shades of yellow among the golden foliage. Two large specimens of the katsura tree (*Cercidiphyllum japonicum;* 30-2E) tower above the valley, growing on the ridge between Woodland Garden and Loderi Valley, and are thus best seen from the northeast. In autumn, the mature foliage of this handsome species takes on almost the same coral tones as the new leaves in spring.

You can return to the Visitors Center by several routes. If you wish to see a selection of crab apples (33-5E), cross the road to the meadow, where a number of them line a service road extending toward the east. Their fruits range in color from deep red—almost purple—to yellow and orange; one even has pale yellow with pink cheeks. Up the hill and north of them along the road, is a hedge consisting of various selections of firethorn, *Pyracantha* (35-5E). From there, walk along Arboretum Drive East where the last specimens of *Oxydendrum* can be seen before reaching the Visitors Center. Or, reach the Visitors Center by wandering through the Woodland Garden, climbing its northern side to the Winter Garden, and following the eastern edge of Azalea Way.

Jan Pirzio-Biroli, former editor of the *Bulletin,* has volunteered for The Arboretum Foundation since the 1960s. She is retired from the Center for Urban Horticulture and is a member of the *Bulletin's* editorial board.

Environmentally Safe Tips from The Pat Calvert Greenhouse

Using less-toxic pest control in the greenhouse

BY ANN O'MERA

At The Arboretum Foundation's Pat Calvert Greenhouse, we try to use methods that are low in toxicity for insect and disease control, so we can protect our volunteers and the environment. To do so, the volunteers have incorporated ideas from Integrated Pest Management (IPM) books with advice from other gardeners. Our experiences might help you to reduce pesticide use.

First, monitor plants regularly so you can find new outbreaks of pests before they develop large populations. Early discovery makes it more likely that you can use a low level of control. With just a few plants, you can even hand pick insects and destroy them. A hand lens is indispensable for finding and recognizing new pests. In fact, juvenile spider mites and scale are almost impossible to see without one.

Be consistent. Many IPM strategies require more care more often. Usually pests return sooner because the less-toxic soap sprays or physical methods do not have the residual killing power of stronger chemicals. However, the tasks are never as unpleasant as using synthetic pesticides. Some articles about IPM do not stress enough that you need to continue monitoring your plants; one spray will not be adequate.

Yellow sticky traps are now used to catch fungus gnats and white fly in the greenhouse. The traps are 3-x-5-inch plastic cards suspended on wire stakes above the plant foliage. The insects are attracted to the yellow color and get stuck to the card. These are meant to monitor the population but work so well they seem to keep the pests under control all by themselves.

If you notice leaves that look dry with a silvery sheen on top and a dirty peppery residue on the undersides, you probably have thrips. The adults look like little black lines that will move if you nudge them. They are easy to spot with a hand lens.

Thrips are attracted to blue, so the greenhouse uses blue sticky trap cards to catch them. When adults reach the flying stage, they are attracted to the cards and get stuck on them.

Four types of spraying are used in the greenhouse. The easiest is a strong jet of water. Water washes away aphids, spider mites, thrips, and other pests that crawl around, munching on your plants. One spray is not enough because some survive and new ones will hatch. It is a good idea to spray once a day until you see improvement. After the pests are under control, keep checking the plants because eventually they may be back.

A quick shower is great for houseplants also. At home, water is the only thing I've used on several of my houseplants and potted outdoor shrubs, and they look great.

If spraying with water is not practical for your situation, soap sprays work well for killing soft-bodied insects such as aphids and spider mites. Like the plain water method, you will probably have to spray again because soap only kills insects that come in contact with it. Some will be missed and eggs will not be killed.

A stronger soap spray is available that contains Pyrethrum, a botanical insecticide extracted from an African chrysanthemum. It breaks down more quickly than synthetic pesticides and has some residual killing effect. We have used it to control aphids, spider mites, and thrips on plants kept inside over the winter.

Soap sprays also kill scale but only when in the crawler stage. After they have formed their

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waxy scale, soap does not penetrate. You have to carefully monitor the plant and spray as soon as you see active crawlers.

To control scale, we also use horticultural oil spray. Traditionally it has been used in early spring before plants leaf out. Newer products are not supposed to damage foliage and can be used all year. Horticultural oil, which is considered to be of very low toxicity, smothers insects and kills eggs.

Try to be content, even with a few pests on your plants. If you are too efficient, you will not attract the beneficial insects that prey on these pests.

The strategies we have used at the greenhouse are very simple but are working. While not pest-free, the greenhouse is a safer place for the plants and the volunteers who care for them.

Ann O'Mera is a greenhouse volunteer and member of The Arboretum Foundation's Board of Directors.

Volunteer for The Arboretum Foundation's Pat Calvert Greenhouse.

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What is hydrology?

Hydrology is the study of the movement of water on and under the earth's land surfaces, and the physical and chemical processes accompanying that movement.

The backbone of hydrology is water balance: The amount of water that enters a basin equals the amount of water that flows out of the basin plus any water that is stored in the basin.

Water can enter a basin through precipitation, surface runoff, ground water, and streams and rivers. Water can exit a watershed through evaporation, surface runoff, ground water, and streams and rivers. Water storage is maintained in a system in lakes, ponds, and soil.—Susan Bolton

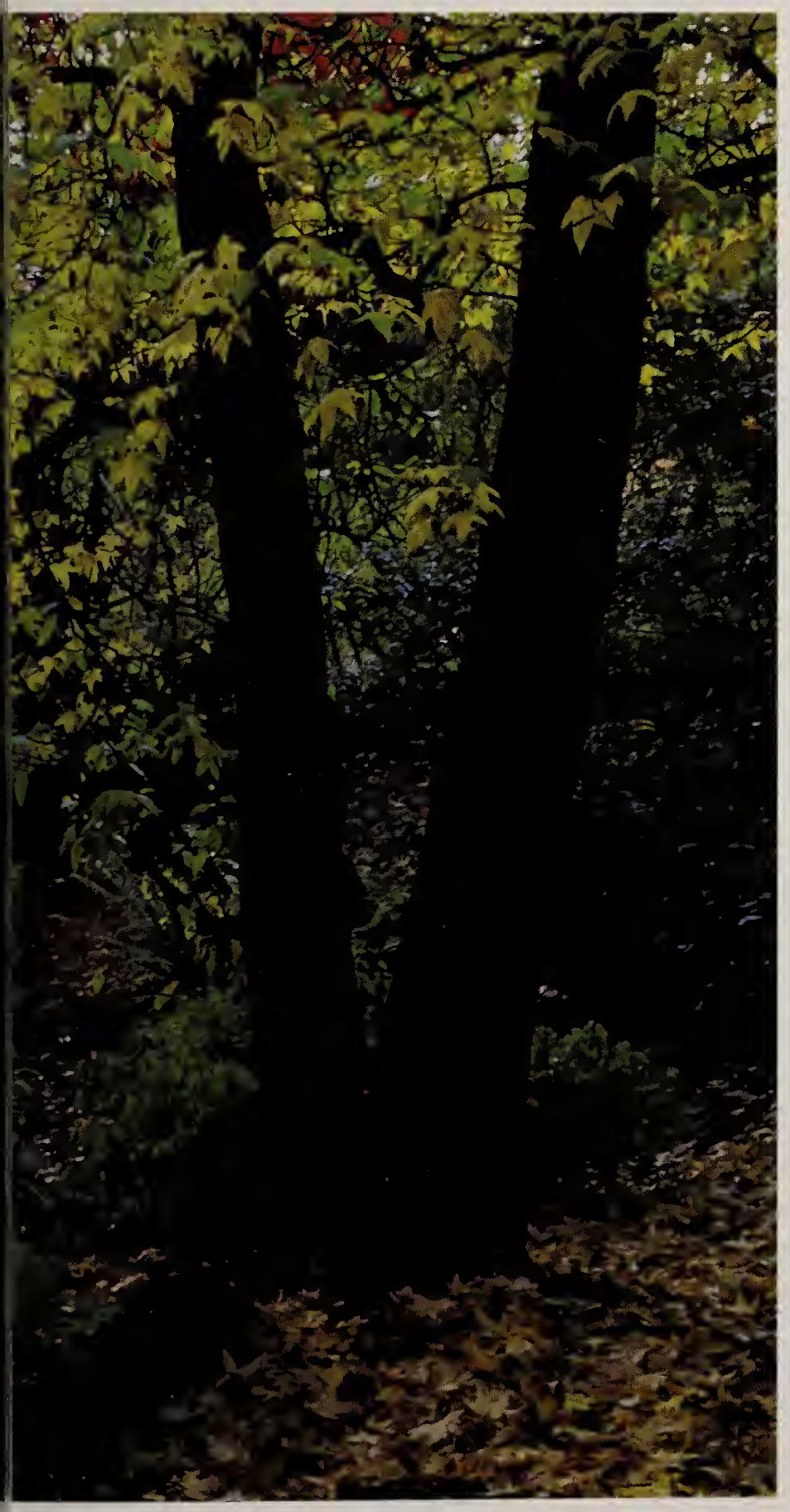
WPA's Woodland Garden Watershed

University students can use the Arboretum's Woodland watershed as a living classroom, while providing information to the Arboretum.

BY SUSAN BOLTON, PH.D. & ABBY HOOK

During the last two winter rainy seasons, the Arboretum's Woodland Garden watershed was used as a field laboratory by the University of Washington (UW) College of Forest Resources. Students of the Forest Management and Engineering Division have collected data on the various inputs and outputs of the Arboretum's hydrologic cycle. These measurements are helpful in determining where the Arboretum's water comes from, where it is held, and finally, where it exits.

In 1998, Dr. Susan Bolton drastically changed her university course on upper-level hydrology from classroom lectures to hands-on work in the Arboretum. Throughout their four years at UW, students in Forest Engineering now have the opportunity to take classes in the Arboretum, ranging from introductory tree identification to advanced hydrology. The hydrology work was designed to teach students the practical applications of field hydrology. Each class conducts field tests and uses



Joy Spurr

A pond at high elevation, close to Arboretum Drive East, drains via a stream into this watershed pond at the bottom of the Arboretum's Woodland Garden. Azalea Way is in the background.

the new flow-measuring device that Dr. Bolton invented with colleagues. Students learn lab skills while providing the Arboretum staff with useful planning data.

The Watershed

Bolton's outdoor classroom is the watershed of the ponds in WPA's Woodland Garden, a small drainage basin that is shared by the Arboretum and adjacent Broadmoor Golf Course.

The upper part of the watershed consists of gentle grass-covered slopes of predominantly clay soil. The lower portion, below Arboretum Drive East, is known as the Woodland Garden. It has steeper forested slopes consisting primarily of western red cedar, Oregon grape, Douglas-fir, and Japanese maple. The soil here tends to have a higher organic content and is better drained than the upper watershed.

A year-round stream flows between the upper storage pond and lower storage pond within the basin. The outflow from the area, a large culvert, crosses Lake Washington Boulevard (to the west) and flows into Arboretum Creek, which shortly reaches Lake Washington.

The Class Study & Results

Dr. Bolton's upper-division wildland hydrology class has taken weekly measurements of precipitation, ground water, soil moisture, streamflow, and water quality in order to learn how to interpret water data that it gathers.

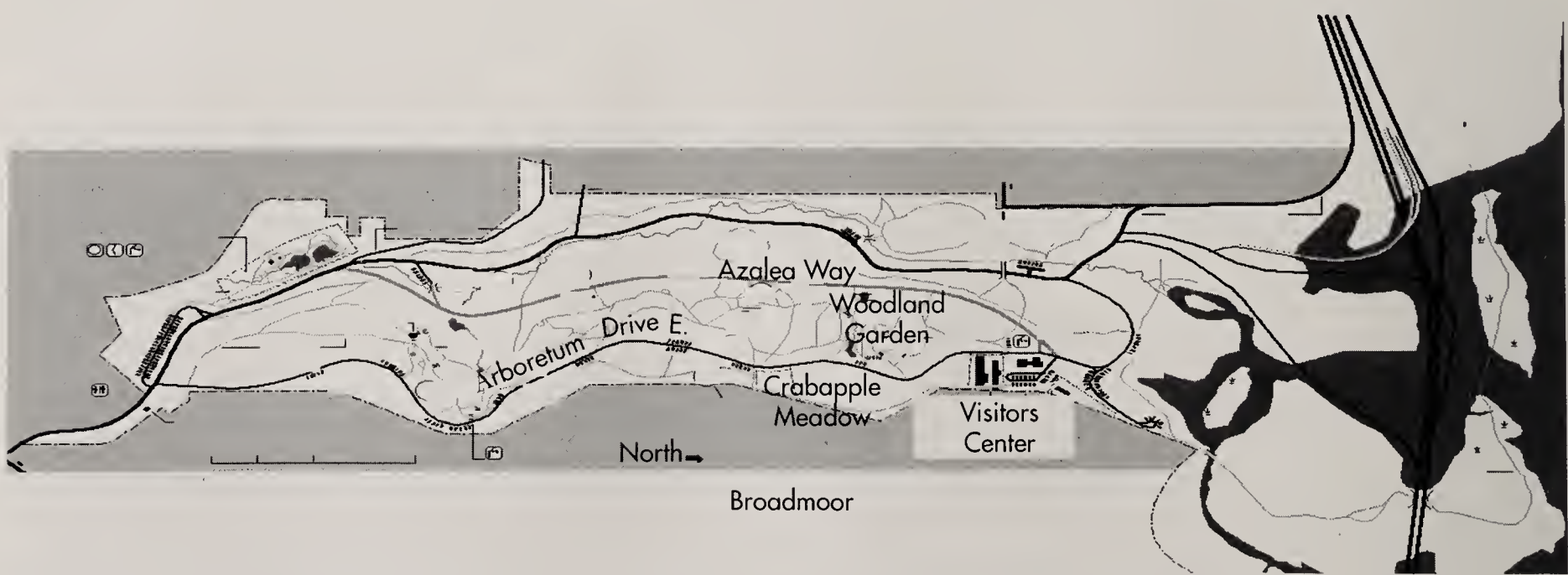
Rainfall was recorded by three rain gauges located next to Graham Visitors Center. The original gauge was manual and read daily by Arboretum staff. Two electronic gauges confirmed that the existing gauge functioned well.

For 1998 and 1999, precipitation was well above normal levels, which created conditions within the Arboretum that may have been atypical. The precipitation data may be most helpful comparing current hydrologic conditions in the Arboretum with its historical data.

The principle findings of the hydrology class concerned sites within the watershed that have poor drainage and little canopy. The upper end of the watershed within the Arboretum boundary is Crabapple Meadow on the east side of Arboretum Drive East, which is a large, bowl-shaped grassy terrain that is a natural collecting area for runoff and precipitation. The field, bordered on the east by the Broadmoor Golf Course, receives all runoff from the impervious surface of Arboretum Drive East. In addition to a natural holding shape, the area has soils with a high clay content. This leads to a low rate of infiltration or soil water uptake.

The class did soil moisture tests and discovered that this area is saturated nearly the entire winter. This implies that the water table is level with the ground surface, making the area unusable for several months during the rainy season.

Across Arboretum Drive East, down the slope and just west of the Woodland Garden, is Azalea Way. Azalea Way suffers from similar drainage problems due to its clay soil type. Even though this area has had many drains installed, the high clay-content soils continue to cause slippery mud patches along the main walkway. Since



The Woodland Garden watershed. Map, courtesy of Washington Park Arboretum.

there are no trees or bushes over this path, no rain is intercepted before reaching the ground.

Information to Help WPA

Though both Azalea Way and the Crabapple Meadow field have a system of French drains installed below the surface, these drains were installed many years ago, and little is known about their effectiveness. This area has plagued the Arboretum staff for many years and efforts continue to solve the drainage problems. Therefore, each year the students are asked to test the Woodland ponds between Crabapple Meadow and Azalea Way to estimate what percentage of the pond water comes from surface versus subsurface water. This information may help WPA understand how the French drains are functioning.

It is valuable to measure how much rain actually reaches the ground under shrub and tree canopies. Interception measurements show which species of trees and shrubs are most effective in sheltering the soil from precipitation. These species could be planted in damp areas to help dry the soils that are typically saturated all season.

The collected data also may help the Arboretum plan future pathways. Simple soil typing and moisture measurements can help define areas with drainage problems. Additionally, the moisture levels could indicate which kind of vegetation would thrive in each area.

Weekly water quality measurements can show whether streams and ponds are receiving sediment from bare areas or trails. Measurements taken directly below the golf course east of the Arboretum could be tested for fertilizer leaching and herbicide chemicals, indicating potentially high levels of unwanted algae in the future. This information may encourage the Arboretum to establish border plants along the golf course boundary to help filter the runoff received into the adjacent Crabapple Meadow.

The Forest Engineering curriculum has been incredibly improved through use of the Arboretum. The cooperation of the staff and visitors has been crucial to this success and is appreciated by everyone involved.

Dr. Susan Bolton is an associate professor of Forest Engineering at the University of Washington; sbolton@u.washington.edu

Abby Hook recently graduated from the Forest Engineering program at the University of Washington.

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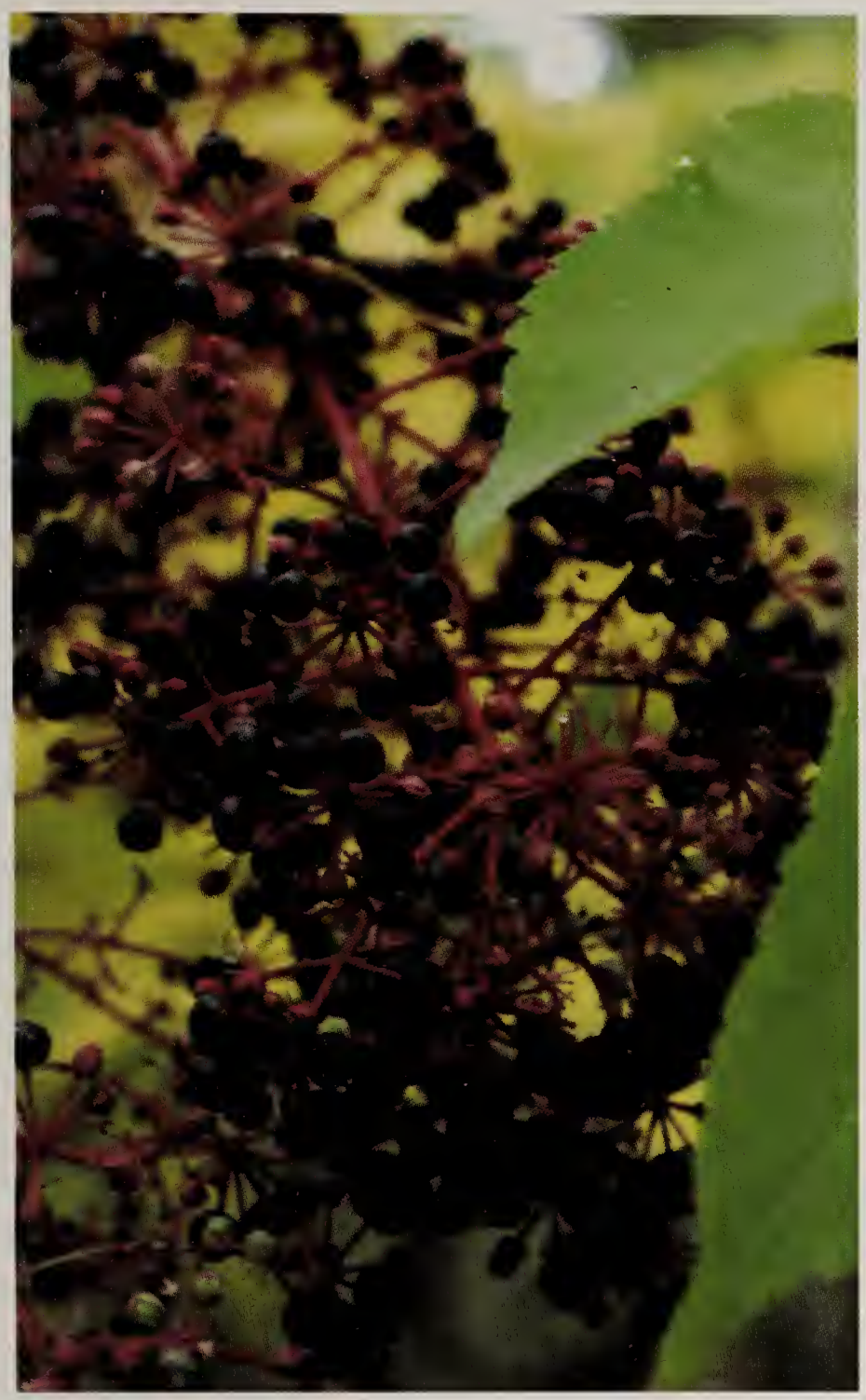
Looking at Autumn in the Arboretum

PHOTOS BY JOY SPURR



Fall is a season of pilgrimage to Washington Park Arboretum. Some visitors seek the red and yellow leaves that they remember from East Coast autumns. Others come to view the variety of trees and shrubs that offer interesting—yet unfamiliar—fruits and flowers that are suitable to grow in the Northwest garden.

Each plant in the Arboretum is given a tag. If you want to know more about a plant that you see, write down the tag's information and ask about it at the reception desk at the Graham Visitors Center.

OPPOSITE PAGE

TOP: *Cercis occidentalis* (Western redbud) and inset of its fall foliage.

BOTTOM: The color of *Abies recurvata* var. *ernestii* foliage contrasts with WPA's colorful deciduous fall leaves. This fir is part of WPA's nationally acclaimed collection.

THIS PAGE

LEFT: *Aralia elata* (Hercules club), fruiting in October

BOTTOM: *Coriaria sarmentosa* is a fall-fruiting shrub.

Cupressus gigantea

What is the true identity of the Arboretum's giant cypress?

BY RANDALL C. HITCHIN & CHRISTOPHER THOMAS GEE

When plants are collected in remote and little-explored regions of the world, their identity is not always known with great certainty. The collectors record the name (sometimes tentatively) and assign a unique collection number. They also typically record geographic location, associated species, elevation, soil type, and other aspects of the locality. These collection data and the collection number are invaluable for future study and identification of the plant.

The collection number will be associated with the original plants or those propagated vegetatively from the originals, regardless of the name changes that may occur through the years.

An excellent illustration of this is the Washington Park Arboretum (WPA) accession 279-48, which currently resides under the name *Cupressus gigantea*. However, behind this name is a long and intricate history of individual name changes and shifting taxonomy.

The accession being discussed was received in 1948 as a packet of seed that was annotated with the collector's note, "*Cupressus* sp., maybe Juniper." The seed had been collected during the 1946–1947 expedition of Ludlow, Sherriff, and Elliott to southeastern Tibet. Arboretum plants from this seed still retain the collection number L.S.&E. 13345, as well as WPA's internal accession number, which was assigned upon arrival.

The accession remained without a name for many years. In 1973, a taxonomist at the British Museum of Natural History concluded that L.S.&E. 13345 was, indeed, a cypress—*Cupressus fallax*—and the Arboretum record was changed to agree with this finding.

The species name was published by João Franco, a Portuguese taxonomist, who had based his description on pressed herbarium specimens of L.S.&E. 13345. The name was widely accepted in Europe and North America.

However, Western taxonomists were not aware that one year prior to Franco's publication, the Chinese botanist S. Y. Hu had published the name *Cupressus chengiana*, also based on specimens from the L.S.&E. 13345 collection location.

In cases such as this, the International Code of Botanical Nomenclature recognizes the first published name as valid. When the name duplication was finally discovered, the cypresses in the Arboretum changed from *Cupressus fallax* to *C. chengiana*.

Close study of the original collection notes continued. In a 1982 issue of the journal *Phytologia*, John Silba observed that L.S.&E. 13345 had actually been collected within the range of *Cupressus gigantea*, far to the south of where *C. chengiana* occurs. The Arboretum record was changed yet again. But the story continues.

In a subsequent letter, Silba informed the Arboretum records office of two pieces of information that had come to light: that *Cupressus gigantea* was not represented outside of China and that L.S.&E. 13345 had actually been collected further south than the range of that species. Silba concluded by reporting that L.S.&E. 13345 was indeed a new species: *Cupressus tongmaiensis*. This latest piece of the puzzle has yet to be confirmed. Although the Arboretum's trees may teeter on the brink of yet another name change, they remain *Cupressus gigantea* for the time being. And even if that changes, they will still be L.S.&E. 13345.

Researchers may frustrate gardeners by seeming to play this name Ping-Pong. However, the fundamental reason behind these changes is that the understanding of Old World cypress has developed through the 20th century. As botanists explore exotic regions and learn more about these species, the names will change to reflect the new knowledge.

Randall C. Hitchin is Registrar & Collections Manager for Washington Park Arboretum.

Christopher Thomas Gee is a student at Michigan State University. During summer 1999, Chris assisted Randall Hitchin, in WPA's Curatorial Office. Reach Chris at: geechris@pilot.msu.edu

OPPOSITE PAGE: *Cupressus gigantea* (foreground) in Washington Park Arboretum. Find specimens in the Pinetum and Conifer Meadow.

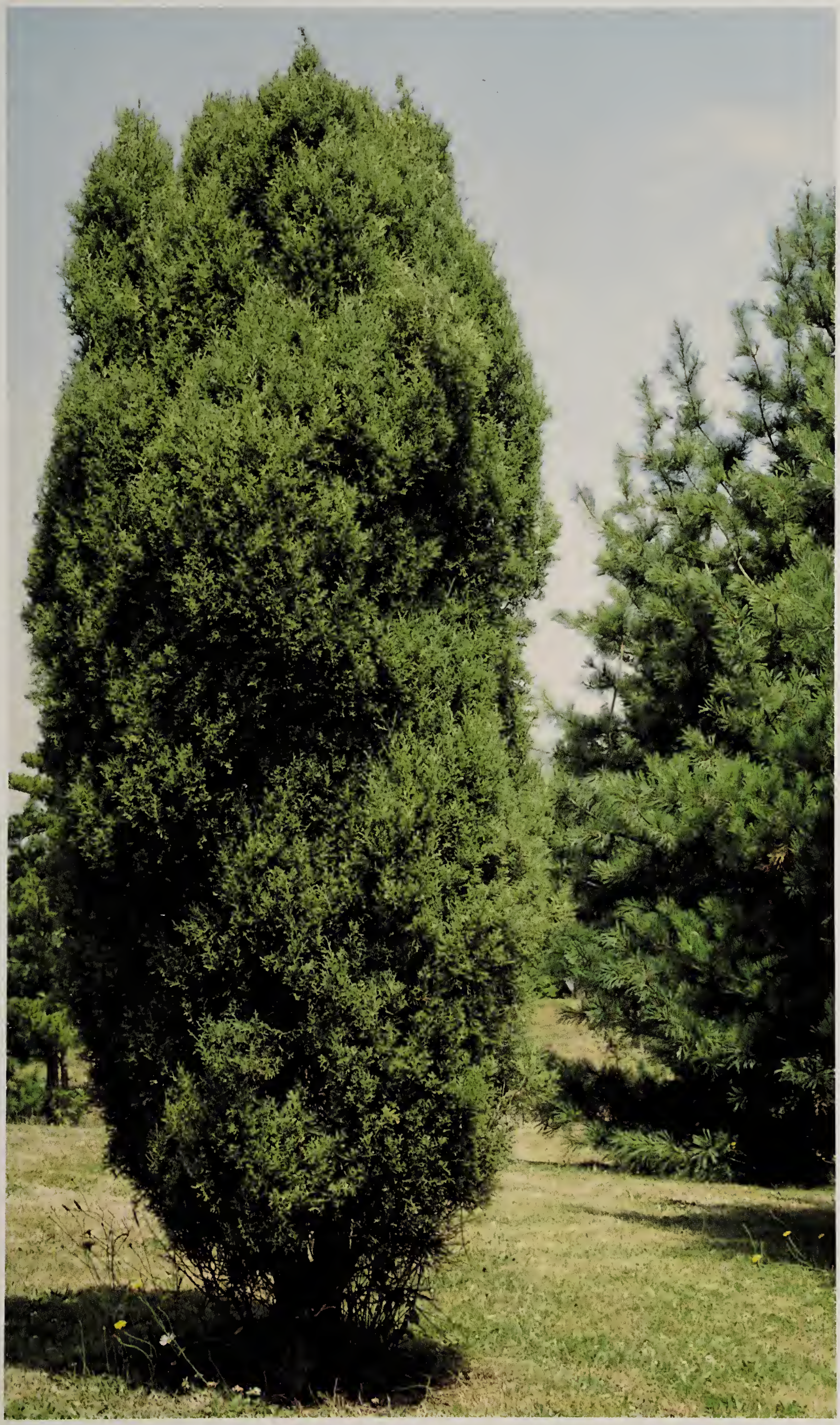


Illustration of watersprouts
by Glen Grantham

Working with Watersprouts

How to train these results of malpruning or avoid them altogether

BY CASS TURNBULL

Amateur pruners frequently confuse watersprouts and suckers, though each should be dealt with differently, for the health of a tree.

Watersprouts are straight, skinny, and rapidly growing shoots. They serve as the emergency regrowth system of a limb, whether it is broken, eaten by a grazing animal, or abused by an ill-informed homeowner with hedge trimmers.

Watersprouts are a sure sign that a pruner is on the wrong track. They grow at the site of a heading cut (the wrong kind of cut) or at the site of a thinning cut (the right kind of cut) if it is too big, too flush, or if the plant has been pruned too much.

Suckers differ from watersprouts in their location and treatment. Though suckers look the same as watersprouts, they are located below the graft union of a tree or shrub or on the tree trunk. They often occur when the plant is stressed and the stronger root stock breaks free. True suckers should be cut off, probably every year, in order to maintain the desired plant.

On the other hand, allow watersprouts to mature into branches, perhaps reducing the total number slowly over many years. Over the course of those years they thicken up, arch over gracefully, and develop lateral branches.

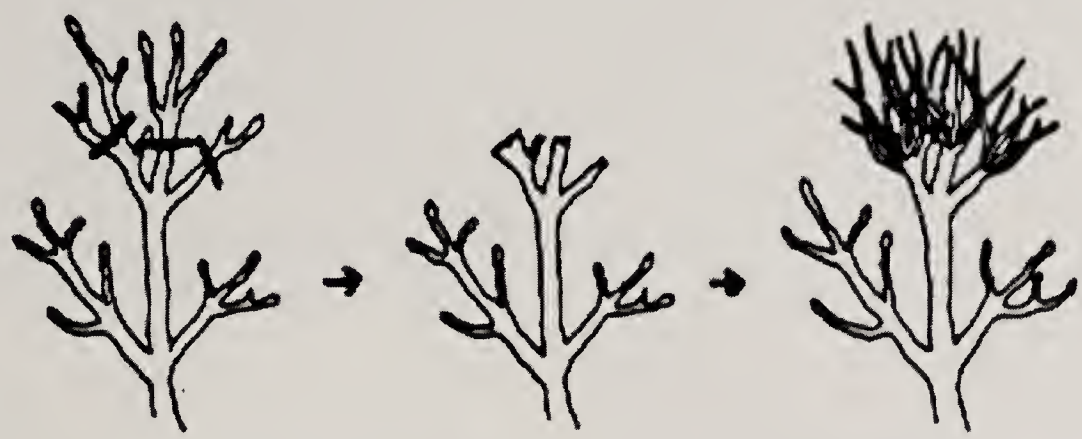
People often base their assessment of pruning on whether or not their aesthetic senses are pleased right after the plant is pruned. This is a mistake that may result in overabundant watersprouts. For example, a common occurrence is to thin an ornamental cherry or plum tree until all of the crossing branches are eliminated. The result is a pretty tree, but an over-thinned one. It also stimulates a nightmare of watersprout regrowth during the next growing season. When those watersprouts are removed (the homeowner's typical reaction), an exponentially greater number return.

Re-removal of watersprouts is not like keeping up with the housework or getting a haircut regularly. Re-removal of watersprouts continues the degradation of the health and beauty of a shrub or tree and is an object lesson in the law of diminishing returns. Every year it takes more and more work to re-tidy the shrub, and each year it develops more and more unruly and ugly watersprouts.

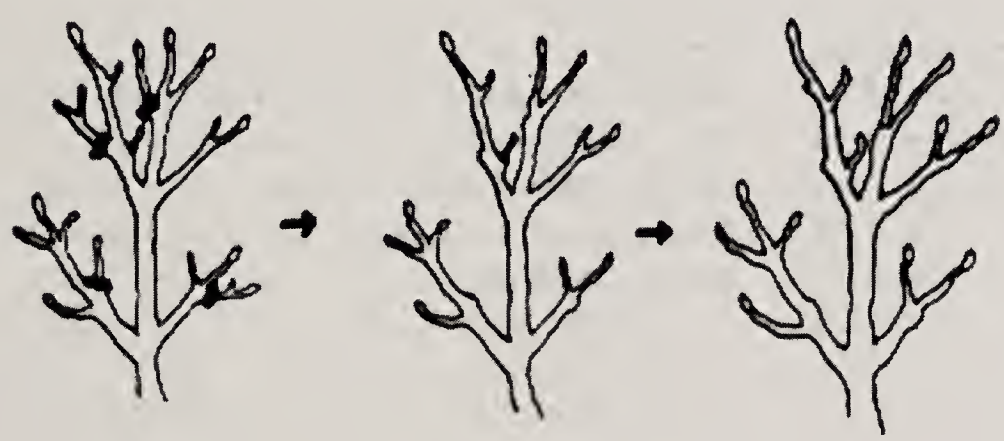
As the tree or shrub is forced to continually produce new shoots (for leaves) and to wall-off (compartmentalize) the cuts, the branches become cracked and mottled, the leaves become prone to disease and insect infestation, and generally everything is on a worsening trajectory. Avoid creating watersprouts by pruning the right way and the right amount—according to the requirements of the shrub or tree.

Cass Turnbull is founder and Executive Director of PlantAmnesty. Her books, lectures, and activism benefit trees throughout the United States. Reach Cass at: 206.783.9813.

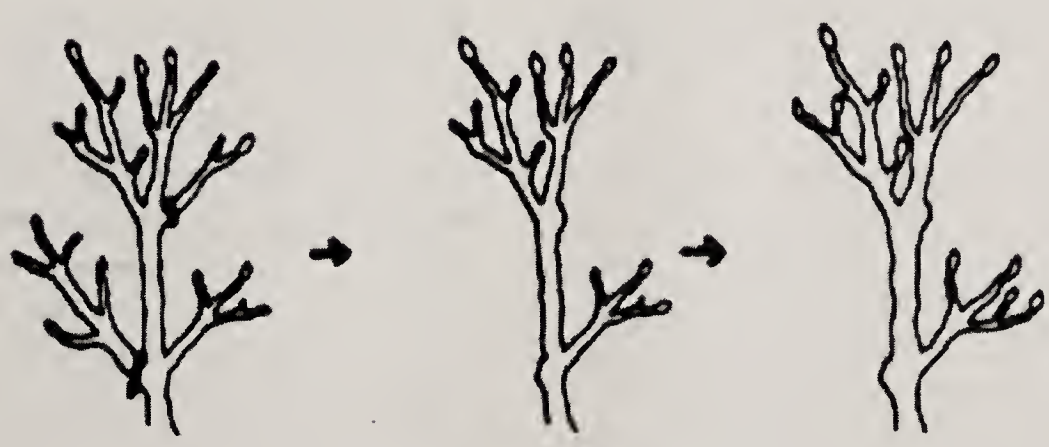
Obtain a free PlantAmnesty brochure on pruning. Send a self-addressed stamped envelope to PA Guide, 906 NW 87th Street, Seattle, WA 98117.



Non-selective heading results in watersprout growth (diagram, above right).



Thinning cuts



Oprtional thinning

Letting a plant grow out of mal-pruning is a lot like growing out your bangs. The in-between phase can drive you nutty. But if you prune too much, too soon, you just get more watersprouts.

Kate Allen

For Further Information

Companion Planting

BY BRIAN THOMPSON

Companion planting can mean two very different things to gardeners. For those who know the delights of growing their own vegetables and herbs, companion planting is a way of grouping plants to encourage greater crop production as well as resistance to damaging insects and other problems. Several excellent books on these practices have been around for quite a while.

A newer approach to plant partnerships is based more on aesthetics, often with plants that are strictly ornamental. The combination of colors, textures, growth habits, and cultural requirements is considered in determining how well two (and possibly three or four) plants work together. This approach does not replace that which examines the bigger picture of overall garden design; rather, it focuses on the fine nuance of details omitted in a larger plan.

One of the finest examples of a book on the aesthetics of companion plants is *Plant Marriages* by Jeff Cox (New York: HarperCollins, 1993). The subtitle, *What Plants Look Good Together—How to Choose the Perfect Plant Combinations for Your Garden,* summarizes the author's intent. After introductory chapters on general design principles, he fills the remainder of the book with recommended pairings, arranged roughly in order of seasonal interest. Each has an in-depth discussion of why this combination works, the growth requirements and habits of each partner, and how these qualities combine. Following this, are suggested substitutes, background plants, or other associations that create a similar effect. Top-notch photographs are an important part of the presentation along with some unexpected juxtapositions to stretch the imagination.

C. Colston Burrell's *Perennial Combinations* (Emmaus, PA: Rodale Press, 1999) is a similar book in many ways. Groups of up to four plants are considered for their compatibility of blooming seasons and cultural requirements. Special themes are included, such as plants for attracting butterflies, a night garden, and cut flowers. Larger garden plans are suggested that incorporate these smaller pieces and are nicely presented in both sketches and plan layouts. Helpful tips are interspersed throughout. Though less detailed than the previous book, this leaves room for many more examples.

John Howell takes a look at one very popular plant marriage in all its permutations in *The Rose and the Clematis as Good Companions* (Woodbridge, Suffolk, UK: Garden Art Press, 1996). After a most exacting description of each plant (even the roots!), Howell discusses their individual advantages and faults in a garden and the factors that make a combination work. Next the author provides the sort of detailed analysis of different combinations you would expect when you learn he is a medical researcher. Considered are such factors as the mixture of flowering times (rose first, clematis first, or together?) and growth habit groups (i.e., climbers or shrubs; hard prune early or not at all). While this may seem excessive, many of the principles for this classic coupling

can be applied to any pairing.

The numerous other books on garden design do not necessarily emphasize the use of companion planting, but their presentation of artful displays provides a number of good ideas on this topic. An excellent new find of local interest is *Shocking Beauty* by Thomas Hobbs of Vancouver, British Columbia (Boston: Periplus, 1999). While he primarily lets the photographs tell the story, the captions and text are quite succinct and insightful at making his points on what works and what does not. The "Good Neighbors" chapter explores companion plantings by outlining key concepts and then urging experimentation instead of analyzing specific combinations.

Planting Companions by Jill Billington (New York: Stewart, Taori & Chang, 1997) expands the idea of companion planting within the context of the overall garden design. Perhaps more so than any of the other authors, Billington walks the reader step by step, through all the elements to consider when using two or more plants together. Many larger design questions and garden plans are included, but the focus of the discussion is typically illustrated by insets of duos and other small groupings. Finally, the author turns to the long-term concerns of how well these partnerships will last over the years and how to make selections that seem to like growing together. In this, she brings us full circle by tying together the two meanings associated with the practice of companion planting.

More Reading

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Brian Thompson is a librarian at the Elisabeth C. Miller Library at the University of Washington's Center for Urban Horticulture.

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